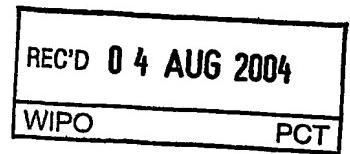




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Patent Office
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I, LEANNE MYNOTT, MANAGER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2003902259 for a patent by TELEZYGOLOGY INC. as filed on 13 May 2003.



WITNESS my hand this
Twenty-eighth day of July 2004

LEANNE MYNOTT
MANAGER EXAMINATION SUPPORT
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AUSTRALIA
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PROVISIONAL SPECIFICATION
FOR A PROVISIONAL PATENT

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Invention Title: Improved Assembly System

The following statement is a description of this invention

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This invention relates to an improved assembly system. The practical focus on the invention is on an improved assembly system for use in conjunction with computer assembly and disassembly. However, the scope of the invention is not necessarily limited to this situation.

6 Traditionally, the art of assembly or disassembly depends on a procedure or plan. In the simplest form, the assembly plan may be in the memory of a human assembler. Slightly more complex assemblies may require written instructions. More sophisticated assembly may require a detailed formal protocol, with each step in the assembly mapped out in detail, and using computer programs to control robotic installation.

10 Whether the assembly is simple, complex or sophisticated, and whether the assembled article is a simple toy, a piece of furniture or an automotive vehicle, for example, it is required that the parts and sub-assemblies are in the correct spatial position and have the correct position relative to other parts and sub-assemblies.

It is an object of the present invention to facilitate assembly and/or disassembly and
15 preferably to facilitate one or more of the following:

- (a) control of assembly and/or disassembly by computer program;
- (b) understanding of the relationship between the parts;
- (c) control of servicing by computer program;
- (d) control of inventory;
- 20 (e) quality assurance; and
- (f) provision of alternate pathways to assembly and/or disassembly.

In a broad form this invention provides an improved assembly system which includes:

25 a sensing means associated with a part for the assembly, the sensing means being capable of sensing proximity and/or structural connection of the part to an element,

means for communicating information obtained from the sensing means as to proximity and/or structural connection of the part,

information processing means for processing information communicated by the communication means, and, optionally

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information display means for displaying information interpreted by the information interpreter means.

The assembly system of the invention may be suitable for a wide range of uses, ranging from simple to complex to sophisticated systems. Preferably, however, the improved
5 assembly system of the invention is used for complex or sophisticated assemblies.

The assembly may be of any suitable type. Mentioned by way of example are building assemblies (including doors, windows, walls, etc), automotive vehicle assemblies and vehicle sub-assemblies, such as sound system installations. These are merely a small sample of the wide range of assemblies for which the assembly system of the invention
10 may be suitable.

The sensing means may be associated with every part in the assembly or with one or some only of those parts. The sensing means may be chosen from any suitable sensing means. Some non-limiting examples are Hall Effect sensors, microswitches, optical fibre connections, proximity switches, electronic strain gauges and magnetic proximity
15 detectors. By way of another example, the sensing means may involve connection of the part to an earthed circuit when the part is in proximity to a particular element. Movement of the part out of proximity (to a selected extent) can break the earth connection and signal lack of proximity.

The sensing means may have more than one function. It may operate as a sensor for the
20 system of the invention. It may also operate as a fastener, to fasten one part to another. The fastener may be a fastener disclosed by any of the following patent application, the contents of which are imported herein by reference: International Patent Application No. PCT/AU99/00185 (Fixing and Release Systems), Australian Patent Application No. PS3123 (Further Improvements in Fixing and Release Systems), Australian Patent
25 Application No. 2002950303 (Improvements in Assembly), Australian Patent Application No. 2002953616 (Bolt Assembly), Australian Patent Application No. 2002953229 (Further Improvements in Assembly and Disassembly) and Australian Patent Application No. 20033901352 (Fastener for Air Bags and Other Uses).

There may be more than one sensing means per part. In this case, each sensing means
30 may have the same or a different function. For example, a part having a square perimeter may have a first sensing means for sensing proximity of a corner of the part to other elements. A second sensing means may sense proximity of an edge of the perimeter, not being located at a corner, to another element.

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In addition to the proximity/connection sensing means, the system of the invention may include sensing means for other purposes, or the proximity sensing means may be capable of sensing other information in addition to proximity. For example, it may be desirable to sense the presence or absence of a part. It may be desirable to sense the identity of a part, so that it can be detected whether the part is a genuine part or not. These functions may be carried out by the proximity sensing means in the system of the invention or by separate sensing means.

The sensing means senses the proximity of the part to an element. The element may be another part in the assembly or it may be something else, for example something related to the environment in which the assembly is to be inserted or used. As an example, if the assembly is to be placed in a frame or contained in a casing, the element may be all or a portion of that frame or casing.

The communication means may be any suitable means. Preferably, the communication means involves a computerised network.

The communications means may involve electrical, data and/or optical connections at relevant positions on the parts of the assembly. Networking may involve hard wiring or wireless connection, using any suitable method.

The information processing means is preferably a computer which translates the information received via the communication means into a user-friendly form which is capable of display on the information display means (if present). The information display means is preferably a screen of suitable type, such as an LCD screen, for example. The information display means is preferably included when the system is intended for human participation.

As indicated above, the system of the invention has wide applicability. An example of how the system of the invention can be employed will be briefly described in connection with one of the illustrations in Australian Patent Application No. PS3123. Figures 19, 20 and 21 of that disclosure show, respectively, an embodiment of a connecting means or fastener, designed for "intelligent" use, a front elevation of a vehicle dashboard fascia and a cross sectional view of that fascia. A copy of Figures 19 to 23 is annexed.

The vehicle fascia 70 in Figures 20 and 21 contains a radio 72 held in fascia 70 by one or more overhang fasteners 60 (refer Figure 19). One such overhang fastener 60 is just discernible in Figure 21 and is quite small. Fastener 60 is not easily assessable from the outside of fascia 70. Fastener 60 can be addressed via a microprocessor or connection

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to a circuit board and can be activated so as to release radio 72 from its position in fascia 70.

A plurality of fasteners 60 may be involved in retaining radio 72 in position in fascia 70. The plurality of fasteners, being individually addressable, may be connected by a multi-drop communications and power feed bus in the configuration shown conceptually in Figure 22. Any suitable number (n) of fasteners 60 may be integrated in this configuration, which is controlled by a common control unit and power feed 80.

As a variation, as shown in Figure 23, fastener 60, again being individually addressable, may be connected by a multi-drop network 82 controlled by a computer 84, with a separate power supply 86.

An automobile console such as that represented in Figures in 20 and 21 may be designed so that the parts can be assembled or disassembled only by use of a computer program. In order to remove and replace radio 72, intelligent fasteners 60 are instructed to release, in the manner referred to above, so that the radio can be removed and replaced. On fascia 70 may be a trim facing which must be removed in a particular sequence. The trim facing may be secured by more fasteners 60. In applying the system of the present invention, the computer program involved in the disassembly receives information as to whether the trim facing has been removed or not. For this purpose, magnetic proximity sensors are arranged around the perimeter of the trim facing, either integrated with fastener 60 or as separate devices. The proximity sensors convey information as to the proximity of each part of the trim to the fascia, the information is conveyed using the computer network and processed by the computer before being displayed on a screen for the computer operator.

When the new radio is installed and the parts are reassembled, the computer program can check for correct spatial position of all the parts, including the facing trim. If an identity sensor is included, the program can also check to see if genuine replacement parts have been used and report on that aspect.

The invention will be further illustrated by elemental constructions in the accompanying sketches. The sketches show how the parts in an assembly can relate to each other and how they can be assembled in two different forms to result in different types of assembly.

In the accompanying sketches:

Figure 1 shows in plan view six different parts, which happen to be identical in this sketch;

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Figure 2 shows in perspective view an assembly formed by the parts in Figure 1, the assembly in this case being a box; and

Figure 3 shows the same six parts of Figure 1 after assembly into a different form, being a channel.

- 5 Referring first to Figure 1, there are shown six parts, A, B, C, D, E and F. Each has a square perimeter with four sides 1, 2, 3 and 4 and four corners w, x, y and z.

Each part has a corner sensor located at each of corners w, x, y and z. Each part also has an edge sensor, located approximately in the centre of each of sides 1, 2, 3 and 4.

- 10 Located approximately in the region of the letter A, B, C, D, E and F is a part identification sensor to identify each part to the computer.

Using a first program, parts, A, B, C, D, E and F are assembled to form the box shown in Figure 2. The computer recognises the identity of each part through the part identification sensor and is able to use the edge sensors and corner sensors to ensure that the parts are assembled in the desired configuration and with the desired tolerance of
15 snug fit.

It is to be appreciated that, although in the sketches the parts are shown as being identical, they may in fact have special characteristics in use. For instance, part B may be a wall with windows, part C may be a wall with a door and part A may be a ceiling or roof, so that assembly as shown in Figure 2 forms a house.

- 20 If a second program is used to assemble parts A, B, C, D, E and F, they can be configured to form the channel shown in Figure 3. Once again, the computer uses identification of each individual part together with the edge sensors and corner sensors in order to construct the desired assembly.

Because of the information conveyed by the sensors in the case of either the first or the
25 second program, the program can be designed so that the parts are assembled in a strict hierarchy or sequence. The relationship of the assembly to an outside element, such as a street when the assembly in Figure 2 is a house, may also be determined. This can be easily understood if one refers to the example where the assembly in Figure 2 is a house. During assembly, part F is first laid down to form a floor, parts B, C, D and E are
30 erected to form vertical walls and part A cannot be attached as roof until parts B, C, D and E are properly in place on floor F. The assembly is constructed so that part C is closest to the street (not shown) and so that part C is parallel to the street.

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It will be appreciated that many other embodiments of the system of the invention are within the spirit and scope of the invention.

Dated this 13th day of May, 2003

Telezygology Pty Limited

By its Attorneys

Chrysiliou Law

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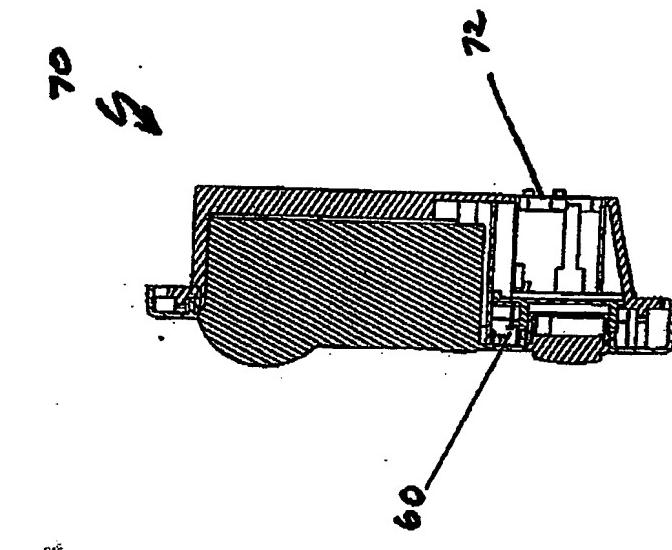


Figure 19

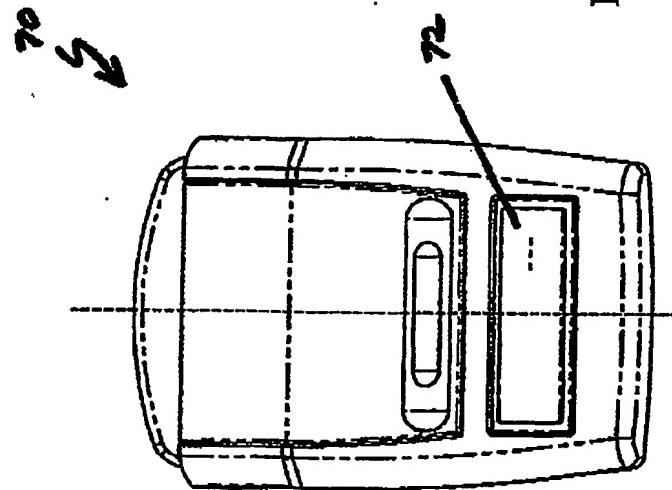


Figure 20

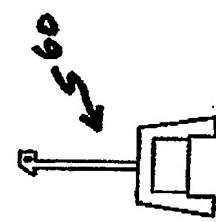
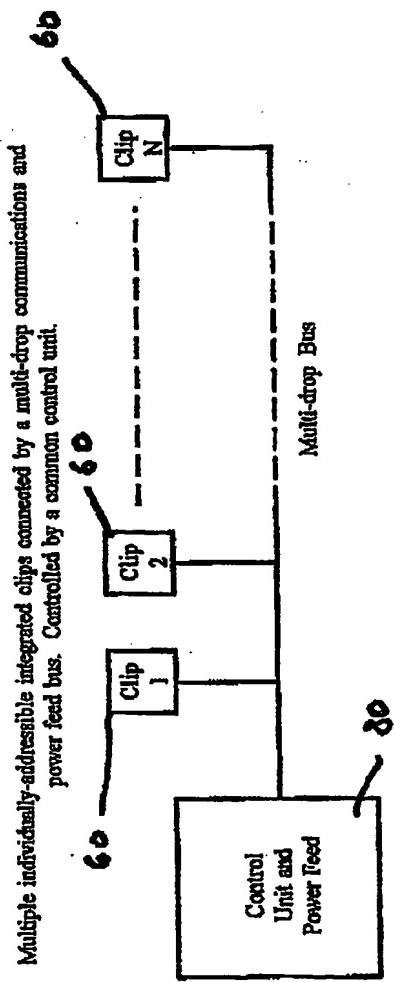


Figure 21

Figure 22



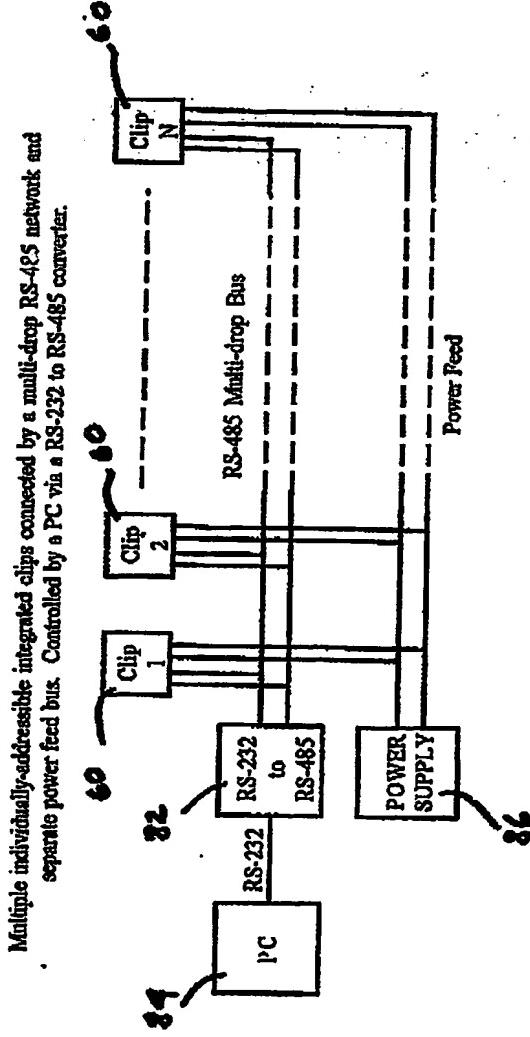


Figure 23

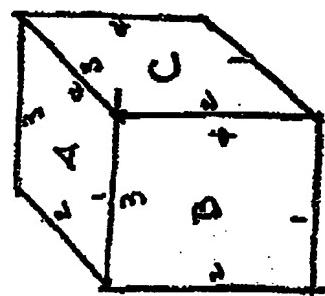


FIGURE 2

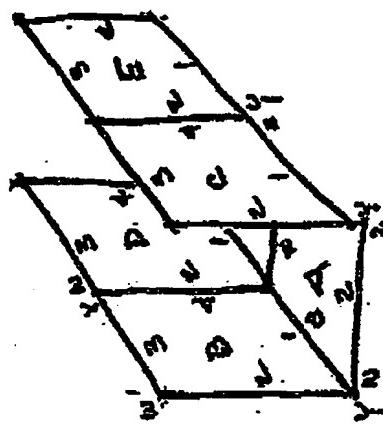


FIGURE 3

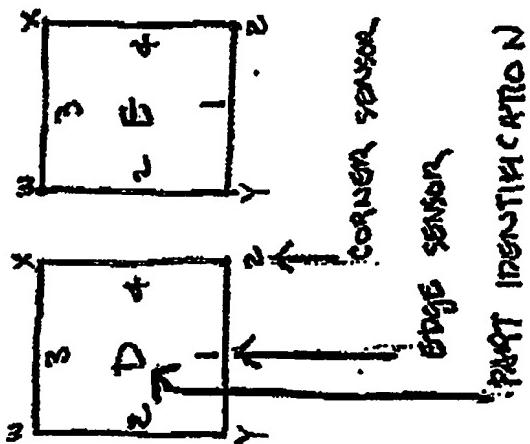
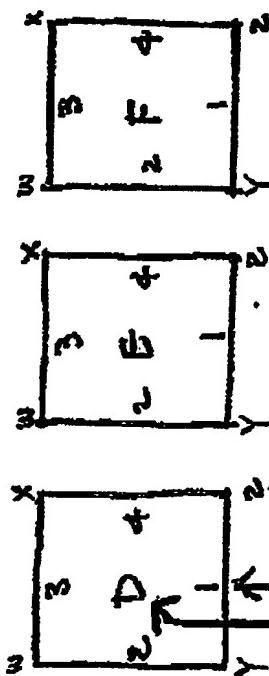
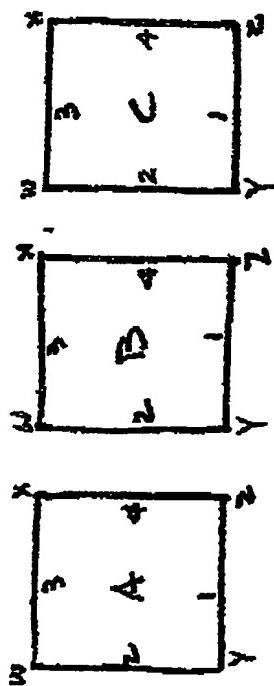


FIGURE 1